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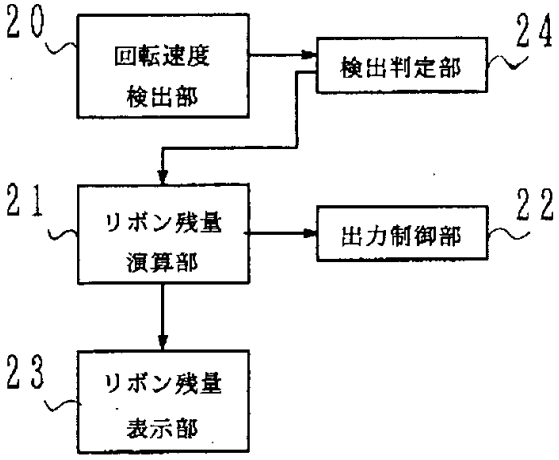
(54)【発明の名称】　インクリボンカセットの残量検知装置

(57)【要約】
【目的】　安価な構成で、オペレータにインクリボンカセットの適切な交換時期をリニアに知らせる。
【構成】　インクリボンカセットの残量検知装置おいて、インクリボンカセットのハブ（リール）の回転速度を検出する手段（例えば、ハブに付けた目印を検知する光センサ等から構成された回転速度検出部２０）と、その検出手段の検出値の正誤を判定する手段（検出判定部２４）と、その判定手段が正と判定した場合のみ、上記回転速度からインクリボンの残量を算出、表示する手段（リボン残量演算部２１およびリボン残量表示部２３）とを設ける。



1

【特許請求の範囲】

【請求項1】　インクリボンカセットを使用する画像形成装置において、インクリボンカセットのハブの回転速度を検出する手段と、該手段の検出値の正誤を判定する手段と、該手段が正と判定した場合のみ、上記回転速度からインクリボンの残量を算出、表示する手段とを設けたことを特徴とするインクリボンカセットの残量検知装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、ファクシミリ等の画像形成装置に用いるインクリボンカセットの残量検知装置に関し、特にオペレータに適切な交換時期をリニアに知らせるインクリボンカセットの残量検知装置に関する。

【0002】

【従来の技術】従来、プラスチックフィルム上にインクを塗布したインクリボンカセットを使用する画像形成装置では、オペレータがインクリボンの残量に気を配り、目視して確認しない限り、インクリボンの交換時期を知ることはできなかった。そのため、画像出力中にインクリボンの終了によって出力が停止した場合、交換用の予備カセットを用意していないということが起こり得る。この対策として、例えば、特開昭61－28614号、特開平2－024188号公報等に記載されているように、図6に示すインクリボンの非転写部41にインクリボンの長さの情報を入れたバーコード、磁性体等を付けてリニアにインクリボンの残量検知を行なう方法が提案されている。また、特開平1－058580号、特開平1－123781号、特開平1－139287号、特開平2－085163号公報等に記載されているように、インクリボンカセットのリール（ハブ）の回転数により、インクリボンの残量検知を行なう方法も提案されている。

【0003】

【発明が解決しようとする課題】上記従来技術の特開昭61－28614号等に記載されている方法では、画像形成装置側にインクリボン長さの情報を読み取る手段を設ける必要があるが、バーコードリーダ、磁気ヘッドは高価であり、インクリボンも従来とは全く別のものとなるため、コストアップをまねく。また、特開平1－058580号等に記載されている方法では、非画像出力時にはインクリボンが走行しないような画像出力装置については配慮がなされていない。本発明の目的は、このような問題点を改善し、安価な構成で、オペレータにインクリボンカセットの適切な交換時期をリニアに知らせることが可能なインクリボンカセットの残量検知装置を提供することにある。

【0004】

【課題を解決するための手段】上記目的を達成するため、本発明のインクリボンカセットの残量検知装置は、

2

インクリボンカセットのハブ（供給側ハブ3あるいは巻取側ハブ4）の回転速度を検出する手段（例えば、ハブに付けた目印5を検知する光センサ等から構成された回転速度検出部20）と、その検出手段の検出値の正誤を、インクリボンが断続的に移動した場合にも容易に判定する手段（検出判定部24）と、その判定手段が正と判定した場合のみ、上記回転速度からインクリボンの残量を算出、表示する手段（リボン残量演算部21およびリボン残量表示部23）とを設けたことに特徴がある。なお、インクリボンの連続移動量または移動時間の正誤判定基準としては、例えば、「ほぼ最大にインクリボンの巻き付いたハブの1回転当たりのインクリボン移動量または移動時間の2倍以上としたもの」、「最大にインクリボンの巻き付いたハブの1回転当たりのインクリボン移動量または移動時間を、回転検出時の分割数Mで割った値の2倍以上としたもの」、「画像出力中のハブのほぼ1回転当たりインクリボンの移動量または移動時間の2倍以上としたもの」、「画像出力中のハブのほぼ1回転当たりのインクリボン移動量または移動時間を、回転検出時の分割数Mで割った値の2倍以上としたもの」等を用いる。

【0005】

【作用】本発明においては、インクリボンカセットのハブ（リール）の回転速度を検出する際、インクリボンカセットの移動量（あるいは移動時間時間）の判定基準により正誤判定を行なう。これにより、断続的なインクリボン移動を行なう画像出力装置においても、安価な構成で正確な回転速度を検出でき、オペレータに適切な交換時期をリニアに知らせることが可能である。

【0006】

【実施例】以下、本発明の一実施例を図面により説明する。図3は、本発明の一実施例におけるインクリボンカセットの概略図である。図3において、1はインクリボンカセット、2はインクリボン、3は供給側ハブ（リール）、4は巻取側ハブ（リール）である。このような構成により、インクリボン2は矢印A方向に定速度Vで移動するので、供給側ハブ3は矢印C方向に回転する。また、巻取側ハブ4は、移動してきたインクリボン2を巻き取るために矢印B方向に回転する。ここで、インクリボン2の残量とハブの回転速度との関係について述べる。いま、供給側ハブ3の半径Rとリボンカセット1の厚さtがわかっているとすると、従動ハブ（巻取側ハブ）4側の回転速度ωとの関係は、次式（1）の通りである。

$$V=(R+N\cdot t)\omega \cdots\cdots (1)$$

ここで、Nは供給側ハブ3に巻かれた現在のインクリボン2の巻きつけ数であり、インクリボン2の残量Eは、次式（2）で表わせる。

$$E=2N\pi\{R+(N-1)/2\} \cdots\cdots (2)$$

また、巻取側ハブ4に巻かれたインクリボン2の半径r

＝R、回転速度ψ、巻きつけ数nより、次式（3）が求まる。

$V=(R+n\cdot t)\psi$……（3）

ここで、インクリボン2の全長をLとすると、残量Eは、次式（4）で表わせる。

$E=L-2n\pi\{R+(n-1)/2\}$……（4）

従って、式（2）に式（1）のNを、式（4）に式（3）のnを代入すれば、残量は回転速度の関数となる。そこで、本実施例では、これらの関係からインクリボン2の残量を算出し、表示する。

【0007】次に、本実施例の残量検知装置の構成について述べる。図1は、本発明の一実施例における残量検知装置の構成を示すブロック図である。図1において、20はハブの回転速度を検出する回転速度検出部、21は上記の関係式によりインクリボン2の残量を算出するリボン残量演算部、22は算出されたインクリボン残量により、画像出力の停止／開始を制御する出力制御部、23はインクリボン残量を表示するリボン残量表示部、24は、回転速度検出部20の検出した値の正誤を判定する検出判定部である。本実施例では、回転速度検出部20によってハブの回転速度を検出し、検出判定部24がその検出を正と判定すると、リボン残量演算部21でインクリボン2の残量を算出し、その残量を示す値をリボン残量表示部23に表示する。この表示内容としては、インクリボン2の残量長さ、標準原稿の出力可能枚数等が考えられる。また、算出されたインクリボンの残量が用紙1枚分も転写できない長さである場合には、出力制御部22の制御により次の用紙に画像出力しないように装置を一時停止する。この間に、インクリボンカセット1を交換する。なお、インクリボンカセット1の消耗を節約するため、例えば、停止した状態から強制的に画像出力を行なう操作をオペレータが選択できるように設定しておき、出力途中でインクリボン2が終了になると、サーマルヘッドをその位置で止め、インクリボンカセット交換後に画像の続きを出力可能とする制御も考えられる。

【0008】次に、回転速度検出部20の構成およびハブの回転速度検知方法について述べる。なお、以下の説明では、供給側ハブ3について述べるが、巻取側ハブ4も同様である。図4は、本発明の第1の実施例におけるハブの回転速度検出方法を示す図である。図4において、5は回転数を検出するため、ハブ3に付けた印であり、他部分と光の反射率が異なる。また、6は、光センサ等から構成され、印5によって回転位置を検知することにより、一回転当たりの時間、すなわち回転速度を測定する。この他にも、例えば、図5～図9に示す構成でハブの回転速度を検知できる。図5の実施例では、ハブ3に突起部7を設け、その突起部7がスイッチ8を押してON／OFFすることにより、回転位置を検知し、回転速度を測定する。図6の実施例では、ハブ3に挿入される回転軸10の一部に光の反射が異なる印11を設け、光センサを含む回転速度検出器6で回転位置を検知し、回転速度を測定する。図7の実施例では、ハブ4に挿入される回転軸10の一部に突起部12を設け、その突起部12がスイッチ8を押してON／OFFすることにより、回転位置を検知し、回転速度を測定する。図8の実施例では、ハブ3に挿入される回転軸10の一部に電圧を負荷した導通部材の突起部13を設け、それが上記電圧とつながる接触板14と触れあうことで、回転位置を検知し、回転速度を測定する。図9の実施例では、ハブ3に挿入される回転軸と連結された起電器30によって、誘導電流により回転位置を検知し、回転速度を測定する。なお、31は回転ロータ、33は、回転ロータ31に巻かれたコイル線、32は磁石、34は外枠である。さらに、これらの実施例で示した印や突起部を複数設けることにより、インクリボン2の移動時間を小さく設定して、移動量をより正確に測定することもできる。

【0009】次に、上記の方法で測定したハブ回転速度の正誤判定方法について述べる。本実施例の検出判定部24は、インクリボン最大巻きつけ時の1回転分の長さ以上の移動が継続してあった場合のみを正値とする。これは、インクリボンカセット1が移動中でも、画像が存在しない場合はインクリボン2は移動せず、その時の回転速度は正しくないためである。ここで、図10のタイミングチャートにより、イングリボン2の移動量測定時の正誤判定を具体的に述べる。本実施例では、インクリボン2の移動量をリボン移動時間Riから換算する。すなわち、巻取側ハブ4を回転させるモータのパルス長（巻取モータパルス時間P）を、移動量とする。例えば、図4～図9に示したように目印（印、突起部等）を一箇所設けた場合、検出開始の目印からの信号は、通常、リボン移動開始よりΔS_1遅れ、インクリボン最大巻きつけ時の1回転分の時間をFとすると、$0<\Delta S_1<F$となる。そして、図10のSTA（検出時間A）に示すように、検出までΔS_1+Fを要する。そこで、検出に必要な時間（判定基準）を2Fとし、$Ri\geqq 2F$の時のみを正値として判定する。また、当間隔で目印を複数設けるか、検出手段（光センサ、スイッチ等）を複数設けるかして、リボン移動時間Riをより小さくすることにより、遅れ時間（STAで示したΔS_1）を少なくすることもできる。ここで、分割数をMとすると、分割数をカウントして、1回転分の時間を検出する方法がある。この場合、STBに示すように、ΔS_2+Fの検出時間を要し、ΔS_2は$0<\Delta S_2<F/M$となる。さらに、STC（検出時間C）に示すように、分割間の時間値に分割数Mをかけ合わせて1回転分の時間を得る方法も可能である。この場合、検出に必要な時間は、$\Delta S_2+F/M$であって、最大でも$2F/M$以下と非常に短くできる。この他にも、上記（1）および（3）式によって、ハブの回転速度をフィードバックし、NまたはnをA

5

求めることにより、使用時のインクリボン2の外径を求め、使用時の1回当たりの時間fを演算する方法も考えられる。すなわち、Fを現在の時間fとして、使用時ごとの必要検出時間を短縮することもできる。なお、本実施例では、ある回転当たりの時間を測定して、回転速度を算出する方法について述べたが、逆に、ある時間当たりの回転量を測定して、回転速度を算出することもできる。

【0010】

【発明の効果】本発明によれば、インクリボンカセットが用紙上を移動中でも、非画像部でインクリボンが移動しない画像出力装置において、インクリボンカセットのハブの回転数を検出する手段、および検出値の正誤を判定する手段を安価な構成で実現し、正確な残量を検出して誤表示を防止することが可能である。従って、オペレータに対し、インクリボンカセットの適切な交換時期をリニアに知らせることができる。

【0011】

【図面の簡単な説明】

【図1】本発明の一実施例における残量検知装置の構成を示すブロック図である。

【図2】従来のインクリボンを示す図である。

【図3】本発明の一実施例におけるインリボンカセットの概略図である。

【図4】本発明の第1の実施例におけるハブの回転速度検出方法を示す図である。

【図5】本発明の第2の実施例におけるハブの回転速度検出方法を示す図である。

【図6】本発明の第3の実施例におけるハブの回転速度検出方法を示す図である。

【図7】本発明の第4の実施例におけるハブの回転速度検出方法を示す図である。

6

【図8】本発明の第5の実施例におけるハブの回転速度検出方法を示す図である。

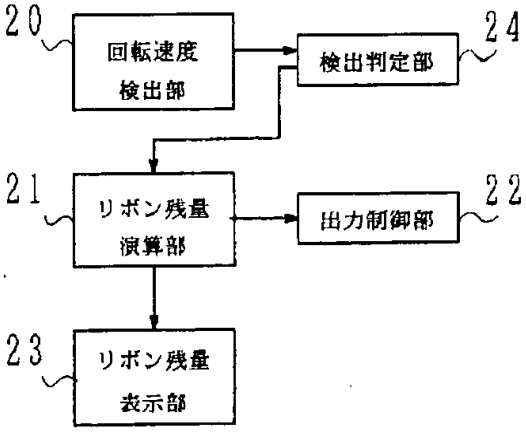
【図9】本発明の第6の実施例におけるハブの回転速度検出方法を示す図である。

【図10】本発明の一実施例におけるハブの回転速度の正誤判定方法を示すタイミングチャートである。

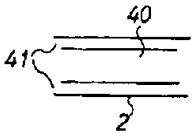
【符号の説明】

1　インクリボンカセット
2　インクリボン
3　供給側ハブ（リール）
4　巻取側ハブ（リール）
5　印
6　回転速度検出器
7　突起部
8　スイッチ
10　回転軸
11　印
12　突起部
13　突起部
14　接触板
20　回転速度検出部
21　リボン残量演算部
22　出力制御部
23　リボン残量表示部
24　検出判定部
30　起電器
31　回転ロータ
32　磁石
33　コイル線
34　外枠
40　転写可能部
41　非転写部

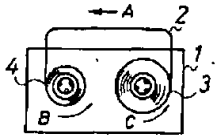
【図1】



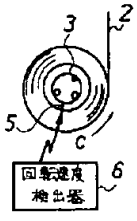
【図2】



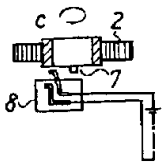
【図3】



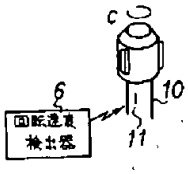
【図4】



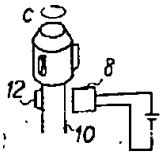
【図5】



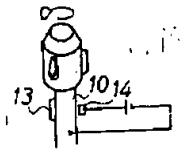
【図6】



【図7】



【図8】


13
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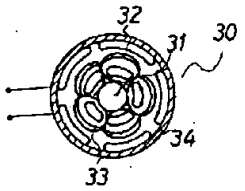
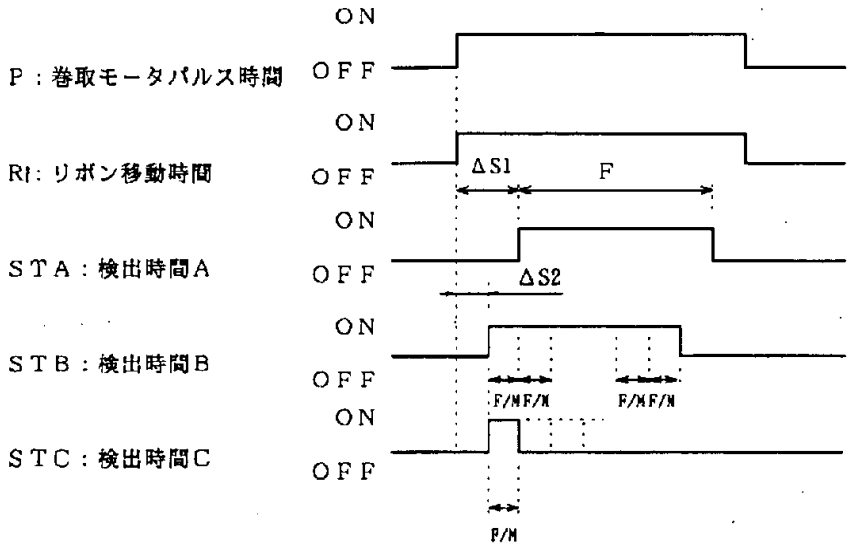
14

【図9】


32
31
30
34
33

【図10】


P：巻取モータパルス時間
Rt：リボン移動時間
STA：検出時間A
STB：検出時間B
STC：検出時間C
ON
OFF
ΔS1
F
ΔS2
F/N
F/N
F/N

PATENT ABSTRACTS OF JAPAN

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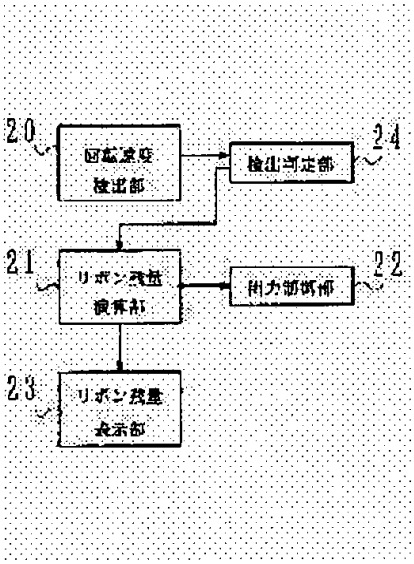
(54) RESIDUAL AMOUNT DETECTOR OF INK RIBBON CASSETTE

(57)Abstract:
PURPOSE: To linearly inform an operator about an adequate time to replace an ink ribbon cassette with a cheap constitution.
CONSTITUTION: A residual amount detector of an ink ribbon cassette is provided with a rotating speed detector (for example, a rotating speed detecting section 20 consisting of a photo-sensor which detects a mark attached on a hub (reel) of the ink ribbon cassette, and others) which detects the rotating speed of the hub, an judging device (a detection judging section 24) which judges whether the detection is right or not, a residual amount arithmetic and indicating devices (a ribbon residual amount arithmetic section 21 and a ribbon residual amount indicating section 23) which calculate and indicate the residual amount of the ink ribbon according to the rotating speed only when the judging device decides it is right.



LEGAL STATUS

[Date of request for examination]

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[Date of final disposal for application]

[Patent number]

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CLAIMS

[Claim(s)]
[Claim 1] Residue detection equipment of the ink ribbon cassette characterized by establishing a means to detect the rotational speed of the hub of an ink ribbon cassette, a means to judge the correction of the detection value of this means, and a means to compute the residue of an ink ribbon and to display from the above-mentioned rotational speed only when this means judges with positive in the image formation equipment which uses an ink ribbon cassette.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] this invention relates to the residue detection equipment of the ink ribbon cassette which tells the suitable exchange stage especially for an operator linearly about the residue detection equipment of the ink ribbon cassette used for image formation equipments, such as facsimile.
[0002]
[Description of the Prior Art] Conventionally, with the image formation equipment which uses the ink ribbon cassette which applied ink on plastic film, unless the operator distributed, viewed and checked mind to the residue of an ink ribbon, exchange time of an ink ribbon was not able to be known. Therefore, when an output stops by the end of an ink ribbon during a picture output, it may happen not to prepare the reserve cassette for exchange. As this cure, the method of attaching the bar code which put the information on the length of an ink ribbon into the non-imprinting section 41 of the ink ribbon shown in drawing 6 , the magnetic substance, etc., and performing residue detection of an ink ribbon linearly is proposed as indicated by JP,61-28614,A, JP,2-024188,A, etc. Moreover, the method of performing residue detection of an ink ribbon is also proposed at the rotational frequency of the reel (hub) of an ink ribbon cassette as indicated by JP,1-058580,A, JP,1-123781,A, JP,1-139287,A, JP,2-085163,A, etc.
[0003]
[Problem(s) to be Solved by the Invention] DDO is expensive to a bar code reader and the MAG, although it is necessary to prepare a means to read the information on ink ribbon length in an image formation equipment side by the method indicated by JP,61-28614,A of the above-mentioned conventional technology etc., since an ink ribbon will also become completely different from the former, a cost rise is imitated, and it is **. Moreover, by the method indicated by JP,1-058580,A etc., consideration is not made about a picture output unit an ink ribbon does not run at the time of a non-picture output. The purpose of this invention improves such a trouble, is cheap composition, and is to offer the residue detection equipment of the ink ribbon cassette which can tell an operator about the suitable exchange time of an ink ribbon cassette linearly.
[0004]
[Means for Solving the Problem] In order to attain the above-mentioned purpose, the residue detection equipment of the ink ribbon cassette of this invention A means to detect the rotational speed of the hub (supply side a hub 3 side or a winding side hub 4) of an ink ribbon cassette (for example, rotational-speed detecting element 20 which consisted of photosensors which detect the mark 5 put on the hub), A means to judge the correction of the detection value of the detection means easily when an ink ribbon moves intermittently (detection judging section 24), Only when the judgment means judges with positive, the feature is to have established a means (the ribbon residue operation part 21 and ribbon residue display 23) to have computed the residue of an ink ribbon and to display from the above-mentioned rotational speed. in addition, as the continuation movement magnitude of an ink ribbon, or an of-corrigenda criterion of a transit time For example, "the thing carried out to the ink ribbon movement magnitude per rotation of the hub where the ink ribbon coiled around the maximum mostly, or more than the double precision of a transit time", "the ink ribbon movement magnitude or the transit time per rotation of the hub where the ink ribbon coiled around the maximum What was carried out to more than the double precision of the value divided by the number of partitions M at the time of rotation detection", "the thing carried out to the movement magnitude of an ink ribbon, or more than the double precision of a transit time per about 1 rotation of the hub under picture output", "What carried out the ink ribbon movement magnitude or the transit time per about 1 rotation of a hub under picture output to more than the double precision of the value divided by the number of partitions M at the time of rotation detection" is used.
[0005]
[Function] In this invention, in case the rotational speed of the hub (reel) of an ink ribbon cassette is detected, the criterion of the movement magnitude (or transit-time time) of an ink ribbon cassette performs an of-corrigenda judging. Also in the picture output unit which performs intermittent ink ribbon movement by this, it is possible to be able to detect an exact rotational speed with cheap composition, and to tell the suitable exchange time for an operator linearly.
[0006]
[Example] Hereafter, a drawing explains one example of this invention. Drawing 3 is the schematic diagram of the ink ribbon cassette in one example of this invention. For 1, as for an ink ribbon and 3, in drawing 3 , an ink ribbon cassette and 2 are [a hub (reel) and 4] hubs (reel) a winding side a supply side. By such composition, since an ink ribbon 2 moves in the direction of arrow A with the degree V of fixed speed, a hub 3 is rotated in the direction of arrow C a supply side. Moreover, a winding side, a hub 4

is rotated in the direction of arrow B in order to roll round the ink ribbon 2 which has moved. Here, the relation between the residue of an ink ribbon 2 and the rotational speed of a hub is described. supposing thickness t of the radius R of a hub 3 and the ribbon cassette 1 is known the supply side now -- a follower -- the relation with the rotational speed omega by the side of a hub (winding side hub) 4 is as the following formula (1)

V=(R+N-t) omega .... (1)

Here, the present ink ribbon 2 wound around the hub 3 the supply side twists N, it is a number and the residue E of an ink ribbon 2 can be expressed with the following formula (2).

E=2Npi {R+ (N-1)/2} .... (2)

moreover, radius r=R of the ink ribbon 2 wound around the hub 4 the winding side and rotational speed psi -- it twists and the following formula (3) can be found from several n

V=(R+n-t) psi .... (3)

Here, a residue E can be expressed with the following formula (4) when the overall length of an ink ribbon 2 is set to L.

E=L-2npi {R+ (n-1)/2} .... (4)

Therefore, if N of a formula (1) is substituted for a formula (2) and n of a formula (3) is substituted for a formula (4), a residue will serve as a function of rotational speed. Then, in this example, the residue of an ink ribbon 2 is computed and displayed from these relations.

[0007] Next, the composition of the residue detection equipment of this example is described. Drawing 1 is the block diagram showing the composition of the residue detection equipment in one example of this invention. In drawing 1 , the output-control section which controls a halt/start of a picture output by the rotational-speed detecting element to which 20 detects the rotational speed of a hub, the ribbon residue operation part which computes the residue of an ink ribbon 2 with the relational expression of the above [21], and the ink ribbon residue by which 22 was computed, the ribbon residue display as which 23 displays an ink ribbon residue, and 24 are the detection judging sections which judge the correction of the value which the rotational-speed detecting element 20 detected. In this example, if the rotational speed of a hub is detected and the detection judging section 24 judges the detection by the rotational-speed detecting element 20 to be positive, the residue of an ink ribbon 2 will be computed by the ribbon residue operation part 21, and the value which shows the residue will be displayed on the ribbon residue display 23. As these contents of a display, the output possible number of sheets of the residue length of an ink ribbon 2 and a standard manuscript etc. can be considered. Moreover, when the residue of the computed ink ribbon is the length which cannot imprint a part for one sheet of form, either, equipment is suspended so that a picture output may not be carried out by control of the output-control section 22 at the following form. In the meantime, the ink ribbon cassette 1 is exchanged. In addition, it sets up so that an operator can choose from the stopped state operation of performing a picture output compulsorily since consumption of the ink ribbon cassette 1 is saved for example, and if an ink ribbon 2 is ended in the middle of an output, a thermal head will be stopped in the position and the control which enables the output of a continuation of a picture after ink ribbon cassette exchange will also be considered.

[0008] Next, the composition of the rotational-speed detecting element 20 and the rotational-speed detection method of a hub are described. In addition, although the following explanation describes a hub 3 a supply side, the same is said of a hub 4 a winding side. Drawing 4 is drawing showing the rotational-speed method of detection of the hub in the 1st example of this invention. In drawing 4 , in order that 5 may detect a rotational frequency, it is the mark put on the hub 3, and the reflection factors of other portions and light differ. Moreover, 6 consists of photosensors etc. and measures the time per one revolution, i.e., rotational speed, by detecting a rotation position with the mark 5. In addition, for example, the rotational speed of a hub is detectable with the composition shown in drawing 5 - drawing 9 . In the example of drawing 5 , when a height 7 is formed in a hub 3 and the height 7 pushes and carries out ON/OFF of the switch 8, a rotation position is detected and rotational speed is measured. In the example of drawing 6 , the mark 11 with which reflection of light differs in an part of axis of rotation 10 inserted in a hub 3 is formed, a rotation position is detected with the rotational-speed detector 6 containing a photosensor, and rotational speed is measured. In the example of drawing 7 , when a height 12 is formed in an part of axis of rotation 10 inserted in a hub 4 and the height 12 pushes and carries out ON/OFF of the switch 8, a rotation position is detected and rotational speed is measured. the flow which carried out the load of the voltage to an part of axis of rotation 10 inserted in a hub 3 in the example of drawing 8 -- the height 13 of a member is formed, by coming into contact with the contact bowl 14 to which it is connected with the above-mentioned voltage, a rotation position is detected and rotational speed is measured In the example of drawing 9 , with the electromotive vessel 30 connected with the axis of rotation inserted in a hub 3, a rotation position is detected according to the induced current, and rotational speed is measured. In addition, as for the coil line by which 31 was wound around rotation Rota and 33 was wound around rotation Rota 31, and 32, a magnet and 34 are outer frames. Furthermore, by preparing two or more the marks and heights which were shown in these examples, the transit time of an ink ribbon 2 can be set up small, and movement magnitude can also be measured more to accuracy.

[0009] next, the hub measured by the above-mentioned method -- the of-corrigenda judging method of rotational speed is described the detection judging section 24 of this example -- the ink ribbon maximum volume -- the price -- let only the case where movement more than the length for one rotation at the time is continued be a positive value When, as for this, a picture does not exist [the ink ribbon cassette 1] in movement, an ink ribbon 2 does not move but the rotational speed at that time is because it is not right. Here, the timing chart of drawing 10 describes concretely the of-corrigenda judging at the time of movement magnitude measurement of the INGU ribbon 2. In this example, the movement magnitude of an ink ribbon 2 is converted from the ribbon transit time Ri. That is, let pulse duration (winding motor pulse period P) of a motor which rotates a hub 4 a winding side be movement magnitude. for example, the case where one mark (the mark, height, etc.) is prepared as

shown in drawing 4 - drawing 9 -- the signal from the mark of a detection start -- usually -- a ribbon move start -- deltaS1 -- behind -- the ink ribbon maximum volume -- the price -- it will be set to 0<deltaS1<F if time for one rotation at the time is set to F And as shown in STA (detection time A) of drawing 10 , deltaS1+F is required to detection. Then, time (criterion) required for detection is set to 2F, and only the time of Ri>=2F is judged as a positive value. Moreover, a time delay (deltaS1 shown by STA) can also be lessened by carrying out whether two or more marks are prepared at this interval, or two or more detection meanses (a photosensor, switch, etc.) are established, and making the ribbon transit time Ri smaller. Here, when the number of partitions is set to M, the number of partitions is counted and there is a method of detecting the time for one rotation. In this case, as shown in STB, the detection time of deltaS2+F is required and deltaS2 becomes 0<deltaS2<F/M. Furthermore, as shown in STC (detection time C), the method of multiplying the number of partitions M by the time value during division, and obtaining the time for one rotation is also possible. In this case, time required for detection is deltaS2+F/M, and is made very short with 2 or less F/M at the maximum. In addition, by feeding back the rotational speed of a hub and asking for N or n by the above (1) and (3) formulas, it asks for the outer diameter of the ink ribbon 2 at the time of use, and the method of calculating the time f per time at the time of use is also considered. That is, the required detection time for every time of use can also be shortened for F as the present time f. In addition, although this example described how to compute rotational speed by measuring the time per a certain rotation, rotational speed can also be conversely computed by the ability to measure the rotation per a certain time.

[0010]

[Effect of the Invention] According to this invention, it is able for an ink ribbon cassette to realize a means to detect the rotational frequency of the hub of an ink ribbon cassette, and a means to judge the correction of a detection value, with cheap composition in the picture output unit to which an ink ribbon does not move a form top in the non-picture section in movement, to detect an exact residue, and to prevent misregistration. Therefore, the suitable exchange time of an ink ribbon cassette can be linearly told to an operator.

[0011]

[Translation done.]

* NOTICES *

PRIOR ART

[Description of the Prior Art] Conventionally, with the image formation equipment which uses the ink ribbon cassette which applied ink on plastic film, unless the operator distributed, viewed and checked mind to the residue of an ink ribbon, the exchange stage of an ink ribbon was not able to be known. Therefore, when an output stops by the end of an ink ribbon during a picture output, it may happen not to prepare the reserve cassette for exchange. As this cure, the method of attaching the bar code which put the information on the length of an ink ribbon into the non-imprinting section 41 of the ink ribbon shown in drawing 6 , the magnetic substance, etc., and performing residue detection of an ink ribbon linearly is proposed as indicated by JP,61-28614,A, JP,2-024188,A, etc. Moreover, the method of performing residue detection of an ink ribbon is also proposed at the rotational frequency of the reel (hub) of an ink ribbon cassette as indicated by JP,1-058580,A, JP,1-123781,A, JP,1-139287,A, JP,2-085163,A, etc.

[Translation done.]

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EFFECT OF THE INVENTION

[Effect of the Invention] According to this invention, it is able for an ink ribbon cassette to realize a means to detect the rotational frequency of the hub of an ink ribbon cassette, and a means to judge the correction of a detection value, with cheap composition in the picture output unit to which an ink ribbon does not move a form top in the non-picture section in movement, to detect an exact residue, and to prevent misregistration. Therefore, the suitable exchange time of an ink ribbon cassette can be linearly told to an operator.

[Translation done.]

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] DDO is expensive to a bar code reader and the MAG, although it is necessary to prepare a means to read the information on ink ribbon length in an image formation equipment side by the method indicated by JP,61-28614,A of the above-mentioned conventional technology etc., since an ink ribbon will also become completely different from the former, a cost rise is imitated, and it is **. Moreover, by the method indicated by JP,1-058580,A etc., consideration is not made about a picture output unit an ink ribbon does not run at the time of a non-picture output. The purpose of this invention improves such a trouble, is cheap composition, and is to offer the residue detection equipment of the ink ribbon cassette which can tell an operator about the suitable exchange time of an ink ribbon cassette linearly.

[Translation done.]

* NOTICES *

MEANS

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the residue detection equipment of the ink ribbon cassette of this invention A means to detect the rotational speed of the hub (supply side a hub 3 side or a winding side hub 4) of an ink ribbon cassette (for example, rotational-speed detecting element 20 which consisted of photosensors which detect the mark 5 put on the hub), A means to judge the correction of the detection value of the detection means easily when an ink ribbon moves intermittently (detection judging section 24), Only when the judgment means judges with positive, the feature is to have established a means (the ribbon residue operation part 21 and ribbon residue display 23) to have computed the residue of an ink ribbon and to display from the above-mentioned rotational speed. in addition, as the continuation movement magnitude of an ink ribbon, or an of-corrigenda criterion of a transit time For example, "the thing carried out to the ink ribbon movement magnitude per rotation of the hub where the ink ribbon coiled around the maximum mostly, or more than the double precision of a transit time", "the ink ribbon movement magnitude or the transit time per rotation of the hub where the ink ribbon coiled around the maximum What was carried out to more than the double precision of the value divided by the number of partitions M at the time of rotation detection", "the thing carried out to the movement magnitude of an ink ribbon, or more than the double precision of a transit time per about 1 rotation of the hub under picture output", "What carried out the ink ribbon movement magnitude or the transit time per about 1 rotation of a hub under picture output to more than the double precision of the value divided by the number of partitions M at the time of rotation detection" is used.

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OPERATION

[Function] In this invention, in case the rotational speed of the hub (reel) of an ink ribbon cassette is detected, the criterion of the movement magnitude (or transit-time time) of an ink ribbon cassette performs an of-corrigenda judging. Also in the picture output unit which performs intermittent ink ribbon movement by this, it is possible to be able to detect an exact rotational speed with cheap composition, and to tell the suitable exchange time for an operator linearly.

[Translation done.]

EXAMPLE

[Example] Hereafter, a drawing explains one example of this invention. Drawing 3 is the schematic diagram of the ink ribbon cassette in one example of this invention. For 1, as for an ink ribbon and 3, in drawing 3 , an ink ribbon cassette and 2 are [a hub (reel) and 4] hubs (reel) a winding side a supply side. By such composition, since an ink ribbon 2 moves in the direction of arrow A with the degree V of fixed speed, a hub 3 is rotated in the direction of arrow C a supply side. Moreover, a winding side, a hub 4 is rotated in the direction of arrow B in order to roll round the ink ribbon 2 which has moved. Here, the relation between the residue of an ink ribbon 2 and the rotational speed of a hub is described. supposing thickness t of the radius R of a hub 3 and the ribbon cassette 1 is known the supply side now -- a follower -- the relation with the rotational speed omega by the side of a hub (winding side hub) 4 is as the following formula (1)

$$V=(R+N-t)\ \text{omega} \quad \ldots (1)$$

Here, the present ink ribbon 2 wound around the hub 3 the supply side twists N, it is a number and the residue E of an ink ribbon 2 can be expressed with the following formula (2).

$$E=2N\text{pi}\ \{R+(N-1)/2\} \quad \ldots (2)$$

moreover, radius r=R of the ink ribbon 2 wound around the hub 4 the winding side and rotational speed psi -- it twists and the following formula (3) can be found from several n

$$V=(R+n-t)\ \text{psi} \quad \ldots (3)$$

Here, a residue E can be expressed with the following formula (4) when the overall length of an ink ribbon 2 is set to L.

$$E=L-2n\text{pi}\ \{R+(n-1)/2\} \quad \ldots (4)$$

Therefore, if N of a formula (1) is substituted for a formula (2) and n of a formula (3) is substituted for a formula (4), a residue will serve as a function of rotational speed. Then, in this example, the residue of an ink ribbon 2 is computed and displayed from these relations.

[0007] Next, the composition of the residue detection equipment of this example is described. Drawing 1 is the block diagram showing the composition of the residue detection equipment in one example of this invention. In drawing 1 , the output-control section which controls a halt/start of a picture output by the rotational-speed detecting element to which 20 detects the rotational speed of a hub, the ribbon residue operation part which computes the residue of an ink ribbon 2 with the relational expression of the above [21], and the ink ribbon residue by which 22 was computed, the ribbon residue display as which 23 displays an ink ribbon residue, and 24 are the detection judging sections which judge the correction of the value which the rotational-speed detecting element 20 detected. In this example, if the rotational speed of a hub is detected and the detection judging section 24 judges the detection by the rotational-speed detecting element 20 to be positive, the residue of an ink ribbon 2 will be computed by the ribbon residue operation part 21, and the value which shows the residue will be displayed on the ribbon residue display 23. As this content of a display, the output possible number of sheets of the residue length of an ink ribbon 2 and a standard manuscript etc. can be considered. Moreover, when the residue of the computed ink ribbon is the length which cannot imprint a part for one sheet of form, either, equipment is suspended so that a picture output may not be carried out by control of the output-control section 22 at the following form. In the meantime, the ink ribbon cassette 1 is exchanged. In addition, it sets up so that an operator can choose from the stopped state operation of performing a picture output compulsorily since exhaustion of the ink ribbon cassette 1 is saved for example, and if an ink ribbon 2 is ended in the middle of an output, a thermal head will be stopped in the position and the control which enables the output of a continuation of a picture after ink ribbon cassette exchange will also be considered.

[0008] Next, the composition of the rotational-speed detecting element 20 and the rotational-speed detection method of a hub are described. In addition, although the following explanation describes a hub 3 a supply side, the same is said of a hub 4 a winding side. Drawing 4 is drawing showing the rotational-speed method of detection of the hub in the 1st example of this invention. In drawing 4 , in order that 5 may detect a rotational frequency, it is the mark put on the hub 3, and the reflection factors of other portions and light differ. Moreover, 6 consists of photosensors etc. and measures the time per one revolution, i.e., rotational speed, by detecting a rotation position with the mark 5. In addition, for example, the rotational speed of a hub is detectable with the composition shown in drawing 5 - drawing 9 . In the example of drawing 5 , when a height 7 is formed in a hub 3 and the height 7 pushes and carries out ON/OFF of the switch 8, a rotation position is detected and rotational speed is measured. In the example of drawing 6 , the mark 11 with which reflection of light differs in an part of axis of rotation 10 inserted in a hub 3 is formed, a rotation position is detected with the rotational-speed detector 6 containing a photosensor, and rotational speed is measured. In the example of drawing 7 , when a height 12 is formed in an part of axis of rotation 10 inserted in a hub 4 and the height 12 pushes and carries out ON/OFF of the switch 8, a rotation position is detected and rotational speed is measured. the

flow which carried out the load of the voltage to an part of axis of rotation 10 inserted in a hub 3 in the example of drawing 8 -- the height 13 of a member is formed, by coming into contact with the contact bowl 14 to which it is connected with the above-mentioned voltage, a rotation position is detected and rotational speed is measured In the example of drawing 9 , with the electromotive vessel 30 connected with the axis of rotation inserted in a hub 3, a rotation position is detected according to the induced current, and rotational speed is measured. In addition, as for the coil line by which 31 was wound around rotation Rota and 33 was wound around rotation Rota 31, and 32, a magnet and 34 are outer frames. Furthermore, by preparing two or more the marks and heights which were shown in these examples, the transit time of an ink ribbon 2 can be set up small, and movement magnitude can also be measured more to accuracy.

[0009] next, the hub measured by the above-mentioned method -- the of-corrigenda judging method of rotational speed is described the detection judging section 24 of this example -- the ink ribbon maximum volume -- the price -- let only the case where movement more than the length for one rotation at the time is continued be a positive value When, as for this, a picture does not exist [the ink ribbon cassette 1] in movement, an ink ribbon 2 does not move but the rotational speed at that time is because it is not right. Here, the timing chart of drawing 10 describes concretely the of-corrigenda judging at the time of movement magnitude measurement of the INGU ribbon 2. In this example, the movement magnitude of an ink ribbon 2 is converted from the ribbon transit time Ri. That is, let pulse duration (winding motor pulse period P) of a motor which rotates a hub 4 a winding side be movement magnitude. for example, the case where one mark (the mark, height, etc.) is prepared as shown in drawing 4 - drawing 9 -- the signal from the mark of a detection start -- usually -- a ribbon move start -- deltaS1 -- behind -- the ink ribbon maximum volume -- the price -- it will be set to 0<deltaS1<F if time for one rotation at the time is set to F And as shown in STA (detection time A) of drawing 10 , deltaS1+F is required to detection. Then, time (criterion) required for detection is set to 2F, and only the time of Ri>=2F is judged as a positive value. Moreover, a time delay (deltaS1 shown by STA) can also be lessened by carrying out whether two or more marks are prepared at this interval, or two or more detection meanses (a photosensor, switch, etc.) are established, and making the ribbon transit time Ri smaller. Here, when the number of partitions is set to M, the number of partitions is counted and there is a method of detecting the time for one rotation. In this case, as shown in STB, the detection time of deltaS2+F is required and deltaS2 becomes 0<deltaS2<F/M. Furthermore, as shown in STC (detection time C), the method of multiplying the number of partitions M by the time value during division, and obtaining the time for one rotation is also possible. In this case, time required for detection is deltaS2+F/M, and is made very short with 2 or less F/M at the maximum. In addition, by feeding back the rotational speed of a hub and asking for N or n by the above (1) and (3) formulas, it asks for the outer diameter of the ink ribbon 2 at the time of use, and the method of calculating the time f per time at the time of use is also considered. That is, the required detection time for every time of use can also be shortened for F as the present time f. In addition, although this example described how to compute rotational speed by measuring the time per a certain rotation, rotational speed can also be conversely computed by the ability to measure the rotation per a certain time.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram showing the composition of the residue detection equipment in one example of this invention.
[Drawing 2] It is drawing showing the conventional ink ribbon.
[Drawing 3] It is the schematic diagram of the in ribbon cassette in one example of this invention.
[Drawing 4] It is drawing showing the rotational-speed method of detection of the hub in the 1st example of this invention.
[Drawing 5] It is drawing showing the rotational-speed method of detection of the hub in the 2nd example of this invention.
[Drawing 6] It is drawing showing the rotational-speed method of detection of the hub in the 3rd example of this invention.
[Drawing 7] It is drawing showing the rotational-speed method of detection of the hub in the 4th example of this invention.
[Drawing 8] It is drawing showing the rotational-speed method of detection of the hub in the 5th example of this invention.
[Drawing 9] It is drawing showing the rotational-speed method of detection of the hub in the 6th example of this invention.
[Drawing 10] It is the timing chart which shows the of-corrigenda judging method of the rotational speed of the hub in one example of this invention.
[Description of Notations]
1 Ink Ribbon Cassette
2 Ink Ribbon
3 It is Hub (Reel) Supply Side.
4 It is Hub (Reel) Winding Side.
5 Mark
6 Rotational-Speed Detector
7 Height
8 Switch
10 Axis of Rotation
11 Mark
12 Height
13 Height
14 Contact Bowl
20 Rotational-Speed Detecting Element
21 Ribbon Residue Operation Part
22 Output-Control Section
23 Ribbon Residue Display
24 Detection Judging Section
30 Electromotive Machine
31 Rotation Rota
32 Magnet
33 Coil Line
34 Outer Frame
40 Section Which Can be Imprinted
41 Non-Imprinting Section

[Translation done.]